

What is claimed is:

1. A color solid-state image pickup device comprising:
a plurality of light-receiving sections being arranged
on the surface of a semiconductor substrate in a two-dimensional
array;

complementary color filters which are stacked on all or
portions of the plurality of light-receiving sections, each
complementary color filter blocking incident light of one color
of the three primary colors, to thereby permit transmission
of incident light of remaining two colors of the three primary
colors;

at least first and second color signal detecting layers
which have the complementary color filters stacked thereon and
are formed so as to be separated in a depthwise direction of
the light-receiving section, the first signal detecting layer
detecting a color signal of one color of the light of two colors
having passed through the complementary color filters, and the
second signal detecting layer detecting a color signal of
remaining one color of the light of two colors having passed
through the complementary color filters; and

a signal reading unit for reading the respective color
signals in a distinguished manner, the signal reading unit being
connected to the respective color signal detecting layers.

25 2. The color solid-state image pickup device according

to claim 1, wherein a color signal of one color being different from two colors of the three primary colors, the two colors being detected by a first light-receiving section with the complementary color filter stacked thereon, is determined by
5 subjecting, to interpolation processing, at least one detection signal detected by at least one second light-receiving section which is provided around the first light-receiving section and, at least, detects the color signal of the one color being different from the two colors detected by the first
10 light-receiving section.

3. The color solid-state image pickup device according to claim 1, wherein three types of light-receiving sections are arranged on the surface of the semiconductor substrate,
15 that is, the light-receiving section on which a yellow filter for blocking blue (B) light is stacked, the light-receiving section on which a cyan filter for blocking red (R) light is stacked, and the light-receiving section on which a magenta filter for blocking green (G) light is stacked.

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4. The color solid-state image pickup device according to claim 1, wherein two types of light-receiving sections are arranged on the surface of the semiconductor substrate, that is, the light-receiving section with a yellow filter stacked
25 thereon, and the light-receiving section with a cyan filter

stacked thereon.

5. The color solid-state image pickup device according to claim 1, wherein two types of light-receiving sections are
5 arranged on the surface of the semiconductor substrate, that is, the light-receiving section with a magenta filter stacked thereon, and the light-receiving section on which a green filter for permitting passage of green (G) light is stacked.

10 6. The color solid-state image pickup device according to claim 1, wherein two types of light-receiving sections are arranged on the surface of the semiconductor substrate, that is, the light-receiving section with a magenta filter stacked thereon, and the light-receiving section on which a transparent
15 planarized film is stacked in place of a color filter.

7. The color solid-state image pickup device according to claim 1, wherein four types of light-receiving sections are arranged on the surface of the semiconductor substrate, that
20 is, the light-receiving section with a green filter stacked thereon, the light-receiving section with a yellow filter stacked thereon, the light-receiving section with a magenta filter stacked thereon, and the light-receiving section with a cyan filter stacked thereon.

8. The color solid-state image pickup device according to claim 1, wherein an electric charge path formed from a heavily-doped impurity region, the region extending continuously up to the surface of the semiconductor substrate, 5 is provided in a color signal detecting layer provided in the semiconductor substrate from among the color signal detecting layers.

9. The color solid-state image pickup device according 10 to claim 8, wherein a concentration gradient is set such that a doping level of the color signal detecting layer formed as a heavily-doped impurity region and a doping level of the electric charge path continually connected to the color signal detecting layer increase as the layer and the path approach 15 the signal reading unit..

10. The color solid-state image pickup device according to claim 1, wherein the depth of the first color signal detecting layer and the depth of the second color signal detecting layer 20 are set in accordance with respective wavelengths of the light of two colors having passed through the complementary color filters.

11. The color solid-state image pickup device according 25 to claim 1, wherein on-chip light gathering optical systems

are provided on upper portions of the respective light-receiving sections, and one opening of each light-shielding film corresponds to each of the light-receiving sections.

5 12. The color solid-state image pickup device according to claim 1, wherein the light-receiving sections are arranged in a square solid pattern on the surface of the semiconductor substrate.

10 13. The color solid-state image pickup device according to claim 1, wherein the light-receiving sections are arranged in a honeycomb pattern on the surface of the semiconductor substrate.

15 14. The color solid-state image pickup device according to claim 1,

 wherein the signal reading unit is a vertical transfer path;

 wherein the first color signal detecting layer is a first 20 electric charge storage layer which reads, to the vertical transfer path, stored electric charges corresponding to the quantity of incident light from the light-receiving section, as the color signal; and

 wherein the second color signal detecting layer is a second 25 electric charge storage layer which reads, to the vertical

transfer path, stored electric charges corresponding to the quantity of incident light from the light-receiving section, as the color signal.

5 15. The color solid-state image pickup device according to claim 14,

 wherein the depth of the first electric charge storage layer and the depth of the second electric charge storage layer are set in accordance with respective wavelengths of the light 10 of two colors having passed through the complementary color filters; and

 wherein the depth of the electric charge storage layer for storing electric charges corresponding to the quantity of blue (B) incident light ranges from 0.2 to 0.4 μm ; the depth 15 of the electric charge storage layer for storing electric charges corresponding to the quantity of green (G) incident light ranges from 0.4 to 0.8 μm ; and the depth of the electric charge storage layer for storing electric charges corresponding to the quantity of red (R) incident light ranges from 0.8 to 2.5 μm .

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 16. The color solid-state image pickup device according to claim 1, wherein the signal reading unit is a signal line.

 17. The color solid-state image pickup device according 25 to claim 16, wherein the light-receiving sections store electric

charges in a PN junction section formed as a result of provision
of heavily-doped impurity layers serving as the color signal
detecting layers, in the semiconductor substrate; the electric
charges are caused to discharge by means of photocarriers
5 produced by incident light; and the quantity of change in
electric charges, which varies by means of electric discharge,
is read as the color signal.

18. The color solid-state image pickup device according
10 to claim 17,

wherein the depth of the first heavily-doped impurity
layer and the depth of the second heavily-doped impurity layer
are set in accordance with respective wavelengths of the light
of two colors having passed through the complementary color
15 filters; and

wherein the depth of the heavily-doped impurity layer
for detecting the blue (B) color signal ranges from 0.1 to 0.3
μm; the depth of said heavily-doped impurity layer for detecting
the green (G) color signal ranges from 0.3 to 0.8 μm; and the
20 depth of said heavily-doped impurity layer for detecting the
red (R) color signal ranges from 0.8 to 2.5 μm.

19. The color solid-state image pickup device according
to claim 17, wherein an impurity region which is superimposed
25 on the heavily-doped impurity layer for detecting a blue (B)

color signal and establishes ohmic contact between the heavily-doped impurity layer and the signal line is formed deeper than the heavily-doped impurity layer.